

WHAT IS CLAIMED IS:

1. A substantially pure conopeptide selected from the group consisting of:

(a) contulakin-G comprising the amino acid sequence Xaa₁-Ser-Glu-Glu-Gly-Gly-Ser-Asn-Ala-Thr-Lys-Lys-Xaa₂-Tyr-Ile-Leu (SEQ ID NO:1), where Xaa₁ is pyro-Glu, Xaa₂ is proline or hydroxyproline and Thr₁₀ is modified to contain an O-glycan, wherein said glycan is not Gal(β1→3)GalNAc(α1→);

(b) a generic contulakin-G having the following general formula Xaa₁-Xaa₂-Xaa₃-Xaa₄-Gly-Gly-Xaa₅-Xaa₆-Xaa₇-Xaa₈-Xaa₉-Xaa₁₀-Ile-Leu (SEQ ID NO:2), where Xaa₁ is pyro-Glu, Glu, Gln or γ-carboxy-Glu; Xaa₂ is Ser, Thr or S-glycan modified Cys; Xaa₃ is Glu or γ-carboxy-Glu; Xaa₄ is Asn, N-glycan modified Asn or S-glycan modified Cys; Xaa₅ is Ala or Gly; Xaa₆ is Thr, Ser, O-glycan modified Thr, O-glycan modified Ser, S-glycan modified Cys, Tyr or any hydroxy containing unnatural amino acid; Xaa₇ is Lys, N-methyl-Lys, N,N-dimethyl-Lys, N,N,N-trimethyl-Lys, Arg, ornithine, homoarginine or any unnatural basic amino acid; Xaa₈ is Ala, Gly, Lys, N-methyl-Lys, N,N-dimethyl-Lys, N,N,N-trimethyl-Lys, Arg, ornithine, homoarginine, any unnatural basic amino acid or X-Lys where X is (CH₂)_n, phenyl, -(CH₂)_m-(CH=CH)-(CH₂)_mH or -(CH₂)_m-(C≡C)-(CH₂)_mH in which n is 1-4 and m is 0-2; Xaa₉ is Pro or hydroxy-Pro; and Xaa₁₀ is Tyr, mono-iodo-Tyr, di-iodo-Tyr, O-sulpho-Tyr, O-phospho-Tyr, nitro-Tyr, Trp, D-Trp, bromo-Trp, bromo-D-Trp, chloro-Trp, chloro-D-Trp, Phe, L-neo-Trp, or any unnatural aromatic amino acid, with the proviso that the generic contulakin-G is not a peptide of the formula Xaa₁-Ser-Glu-Glu-Gly-Gly-Ser-Asn-Ala-Thr-Lys-Lys-Xaa₂-Tyr-Ile-Leu (SEQ ID NO:1), wherein Xaa₁ is pyro-Glu, Xaa₂ is proline or hydroxyproline and Thr₁₀ is unmodified or modified to contain an O-glycan;

(c) a generic contulakin-G of (b) which is modified to contain an O-glycan, an S-glycan or an N-glycan;

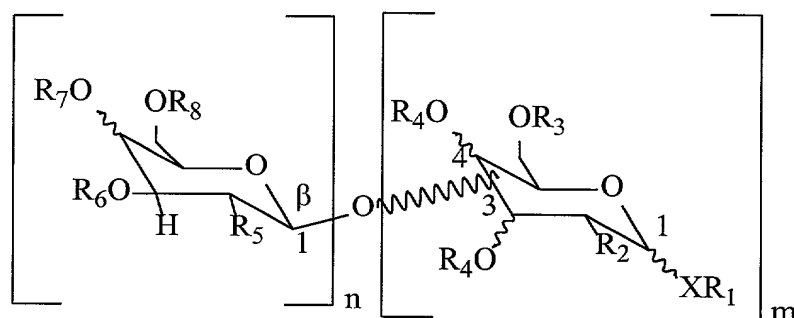
(d) a contulakin-G analog which comprises an N-terminal truncation of from 1 to 9 amino acids of the generic contulakin-G of (b);

(e) a contulakin-G analog of (c), wherein an Ser-O-glycan, Thr-O-glycan or Cys-S-glycan is substituted for the amino acid residue at the truncated N-terminus;

(f) a contulakin-G analog of (c), wherein an Ser-O-glycan, Thr-O-glycan or Cys-S-glycan is substituted for a residue at positions 2-9 of the generic contulakin-G; and

(g) a contulakin-G analog which comprises an N-terminal truncation of 10 amino acids of the generic contulakin-G of (b) which is further modified to contain a Lys-N-glycan at residue 11 of the generic contulakin-G.

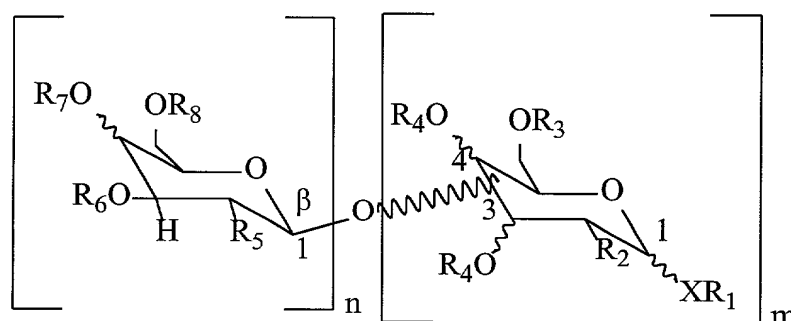
2. The substantially pure conopeptide of claim 1, wherein Xaa₂ of Contulakin-G of (a) is proline.
3. The substantially pure conopeptide of claim 1, wherein Xaa₂ of Contulakin-G of (a) is hydroxy-proline.
4. The substantially pure conopeptide of claim 1, wherein the glycan of Contulakin-G of (a) has the structure



wherein R₁ is an amino acid capable of being derivatized with a glycan either chemically or enzymatically; R₂ is OH, NH₂, NHSO₃Na, NHAc, O-sulphate, O-phosphate, or O-glycan; R₃ is H, SO₃, PO₃, acetyl, sialic acid or monosaccharide; R₄ is H, SO₃, PO₃, acetyl or monosaccharide; R₅ is OH, NH₂, NHSO₃Na, NHAc, O-sulphate, O-phosphate, O-monosaccharide or, O-acetyl; R₆ is H, SO₃, PO₃, acetyl or monosaccharide; R₇ is H, SO₃, PO₃, acetyl or monosaccharide; R₈ is H, SO₃, PO₃, acetyl or monosaccharide; n is 0-4 and m is 1-4.

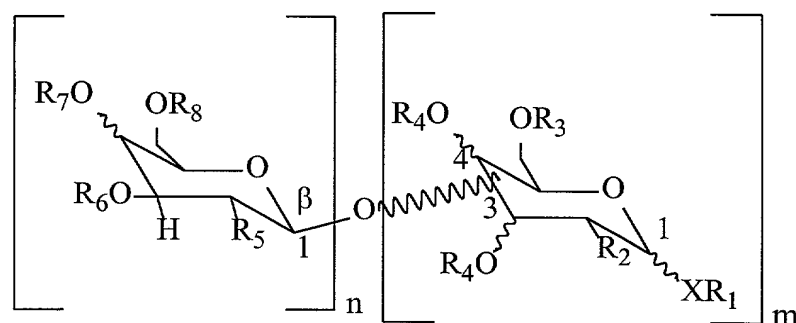
5. The substantially pure conopeptide of claim 4, wherein Xaa₂ of Contulakin-G of (a) is proline.

6. The substantially pure conopeptide of claim 4, wherein Xaa₂ of Contulakin-G of (a) is hydroxy-proline.
7. The substantially pure conopeptide of claim 1, wherein the glycan of the generic Contulakin-G of (b)-(c) and the Contulakin-G analog of (d)-(g) is Gal(β1→3)GalNAc(α1→).
8. The substantially pure conopeptide of claim 1, wherein the glycan of the generic Contulakin-G of (b)-(c) and the Contulakin-G analog of (d)-(g) has the structure



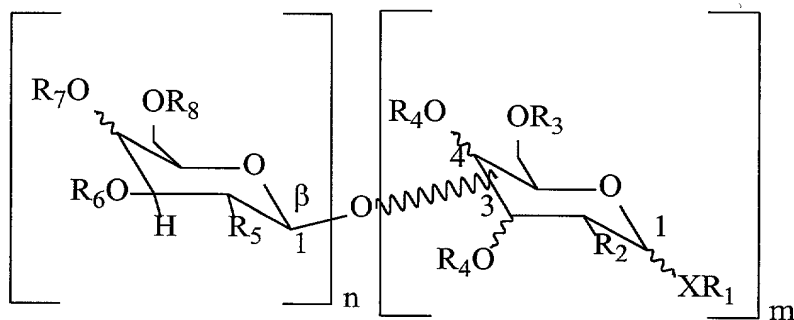
wherein R₁ is an amino acid capable of being derivatized with a glycan either chemically or enzymatically; R₂ is OH, NH₂, NHSO₃Na, NHAc, O-sulphate, O-phosphate, or O-glycan; R₃ is H, SO₃, PO₃, acetyl, sialic acid or monosaccharide; R₄ is H, SO₃, PO₃, acetyl or monosaccharide; R₅ is OH, NH₂, NHSO₃Na, NHAc, O-sulphate, O-phosphate, O-monosaccharide or, O-acetyl; R₆ is H, SO₃, PO₃, acetyl or monosaccharide; R₇ is H, SO₃, PO₃, acetyl or monosaccharide; R₈ is H, SO₃, PO₃, acetyl or monosaccharide; n is 0-4 and m is 1-4.

9. The substantially pure conopeptide of claim 1, wherein the conopeptide is the generic Contulakin-G of (b).
10. The substantially pure conopeptide of claim 9, wherein the glycan is Gal(β1→3)GalNAc(α1→).
11. The substantially pure conopeptide of claim 9, wherein the glycan has the structure



wherein R_1 is an amino acid capable of being derivatized with a glycan either chemically or enzymatically; R_2 is OH, NH_2 , $NHSO_3Na$, $NHAc$, O-sulphate, O-phosphate, or O-glycan; R_3 is H, SO_3 , PO_3 , acetyl, sialic acid or monosaccharide; R_4 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_5 is OH, NH_2 , $NHSO_3Na$, $NHAc$, O-sulphate, O-phosphate, O-monosaccharide or, O-acetyl; R_6 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_7 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_8 is H, SO_3 , PO_3 , acetyl or monosaccharide; n is 0-4 and m is 1-4.

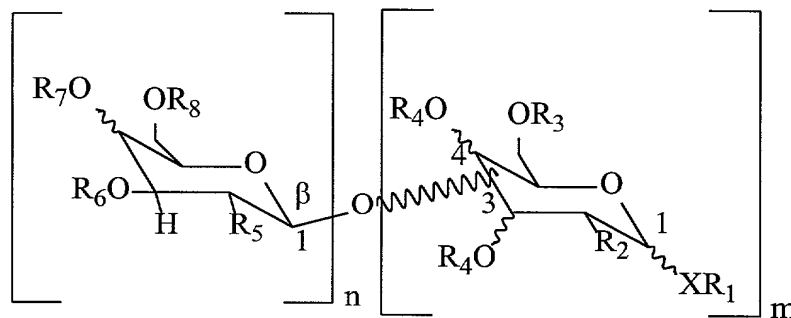
12. The substantially pure conopeptide of claim 1, wherein the conopeptide is the generic Contulakin-G of (c).
13. The substantially pure conopeptide of claim 12, wherein the glycan is $Gal(\beta 1 \rightarrow 3)GalNAc(\alpha 1 \rightarrow)$.
14. The substantially pure conopeptide of claim 12, wherein the glycan has the structure



wherein R_1 is an amino acid capable of being derivatized with a glycan either chemically or enzymatically; R_2 is OH, NH_2 , $NHSO_3Na$, $NHAc$, O-sulphate, O-phosphate,

or O-glycan; R_3 is H, SO_3 , PO_3 , acetyl, sialic acid or monosaccharide; R_4 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_5 is OH, NH_2 , $NHSO_3Na$, $NHAc$, O-sulphate, O-phosphate, O-monosaccharide or, O-acetyl; R_6 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_7 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_8 is H, SO_3 , PO_3 , acetyl or monosaccharide; n is 0-4 and m is 1-4.

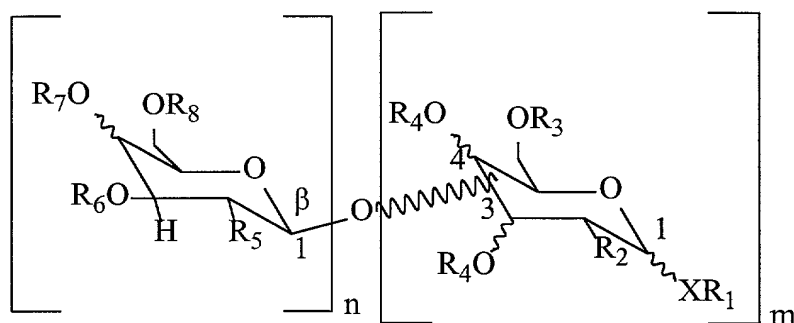
15. The substantially pure conopeptide of claim 1, wherein the conopeptide is the Contulakin-G analog of (d).
16. The substantially pure conopeptide of claim 15, wherein the glycan is $Gal(\beta 1 \rightarrow 3)GalNAc(\alpha 1 \rightarrow)$.
17. The substantially pure conopeptide of claim 15, wherein the glycan has the structure



wherein R_1 is an amino acid capable of being derivatized with a glycan either chemically or enzymatically; R_2 is OH, NH_2 , $NHSO_3Na$, $NHAc$, O-sulphate, O-phosphate, or O-glycan; R_3 is H, SO_3 , PO_3 , acetyl, sialic acid or monosaccharide; R_4 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_5 is OH, NH_2 , $NHSO_3Na$, $NHAc$, O-sulphate, O-phosphate, O-monosaccharide or, O-acetyl; R_6 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_7 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_8 is H, SO_3 , PO_3 , acetyl or monosaccharide; n is 0-4 and m is 1-4.

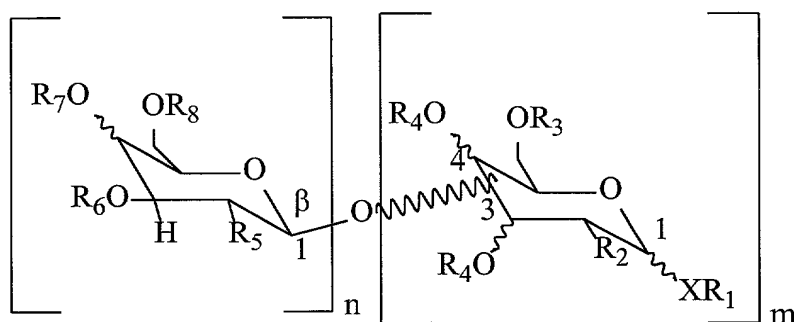
18. The substantially pure conopeptide of claim 1, wherein the conopeptide is the Contulakin-G analog of (e).

19. The substantially pure conopeptide of claim 18, wherein the glycan is Gal(β 1 \rightarrow 3)GalNAc(α 1 \rightarrow).
20. The substantially pure conopeptide of claim 18, wherein the glycan has the structure



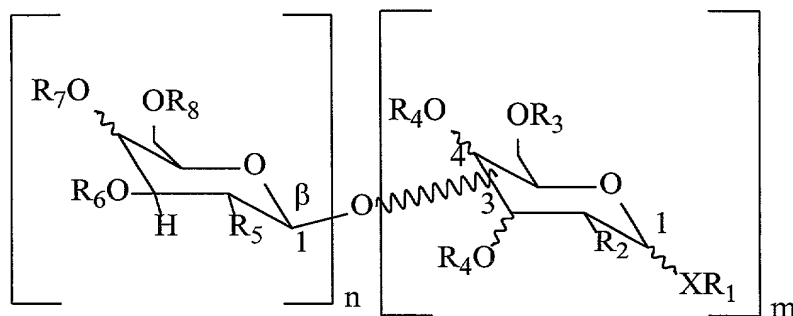
wherein R_1 is an amino acid capable of being derivatized with a glycan either chemically or enzymatically; R_2 is OH, NH_2 , $NHSO_3Na$, $NHAc$, O-sulphate, O-phosphate, or O-glycan; R_3 is H, SO_3 , PO_3 , acetyl, sialic acid or monosaccharide; R_4 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_5 is OH, NH_2 , $NHSO_3Na$, $NHAc$, O-sulphate, O-phosphate, O-monosaccharide or, O-acetyl; R_6 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_7 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_8 is H, SO_3 , PO_3 , acetyl or monosaccharide; n is 0-4 and m is 1-4.

21. The substantially pure conopeptide of claim 1, wherein the conopeptide is the Contulakin-G analog of (f).
22. The substantially pure conopeptide of claim 21, wherein the glycan is Gal(β 1 \rightarrow 3)GalNAc(α 1 \rightarrow).
23. The substantially pure conopeptide of claim 21, wherein the glycan has the structure



wherein R_1 is an amino acid capable of being derivatized with a glycan either chemically or enzymatically; R_2 is OH, NH_2 , $NHSO_3Na$, $NHAc$, O-sulphate, O-phosphate, or O-glycan; R_3 is H, SO_3 , PO_3 , acetyl, sialic acid or monosaccharide; R_4 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_5 is OH, NH_2 , $NHSO_3Na$, $NHAc$, O-sulphate, O-phosphate, O-monosaccharide or, O-acetyl; R_6 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_7 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_8 is H, SO_3 , PO_3 , acetyl or monosaccharide; n is 0-4 and m is 1-4.

24. The substantially pure conopeptide of claim 1, wherein the conopeptide is the Contulakin-G analog of (g).
25. The substantially pure conopeptide of claim 24, wherein the glycan is $Gal(\beta 1 \rightarrow 3)GalNAc(\alpha 1 \rightarrow)$.
26. The substantially pure conopeptide of claim 24, wherein the glycan has the structure



wherein R_1 is an amino acid capable of being derivatized with a glycan either chemically or enzymatically; R_2 is OH, NH_2 , $NHSO_3Na$, $NHAc$, O-sulphate, O-phosphate, or O-glycan; R_3 is H, SO_3 , PO_3 , acetyl, sialic acid or monosaccharide; R_4 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_5 is OH, NH_2 , $NHSO_3Na$, $NHAc$, O-sulphate, O-phosphate, O-monosaccharide or, O-acetyl; R_6 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_7 is H, SO_3 , PO_3 , acetyl or monosaccharide; R_8 is H, SO_3 , PO_3 , acetyl or monosaccharide; n is 0-4 and m is 1-4.

27. The substantially pure conopeptide of claim 1 which is chemically synthesized.
28. The substantially pure conopeptide of claim 4 which is chemically synthesized.
29. The substantially pure conopeptide of claim 7 which is chemically synthesized.
30. The substantially pure conopeptide of claim 8 which is chemically synthesized.
31. The substantially pure conopeptide of claim 9 which is chemically synthesized.
32. The substantially pure conopeptide of claim 10 which is chemically synthesized.
33. The substantially pure conopeptide of claim 11 which is chemically synthesized.
34. The substantially pure conopeptide of claim 12 which is chemically synthesized.
35. The substantially pure conopeptide of claim 13 which is chemically synthesized.
36. The substantially pure conopeptide of claim 14 which is chemically synthesized.
37. The substantially pure conopeptide of claim 15 which is chemically synthesized.
38. The substantially pure conopeptide of claim 16 which is chemically synthesized.

39. The substantially pure conopeptide of claim 17 which is chemically synthesized.
40. The substantially pure conopeptide of claim 18 which is chemically synthesized.
41. The substantially pure conopeptide of claim 19 which is chemically synthesized.
42. The substantially pure conopeptide of claim 20 which is chemically synthesized.
43. The substantially pure conopeptide of claim 21 which is chemically synthesized.
44. The substantially pure conopeptide of claim 22 which is chemically synthesized.
45. The substantially pure conopeptide of claim 23 which is chemically synthesized.
46. The substantially pure conopeptide of claim 24 which is chemically synthesized.
47. The substantially pure conopeptide of claim 25 which is chemically synthesized.
48. The substantially pure conopeptide of claim 26 which is chemically synthesized.